

AMENDMENTS TO THE SPECIFICATION:

On page 1, immediately following the title please insert a heading as follows:

BACKGROUND OF THE INVENTION

On page 1, line 6 please delete the heading.

On page 1, line 6 please insert a heading as follows:

Related Technology

The paragraphs beginning on page 2, line 16 have been changed as follows:

wherein R'' represents a ~~solubilising~~ solubilizing group such as n-octyl.

These polymers have attracted considerable interest as electroluminescent materials because they are solution processable and have good film forming properties. Furthermore, these polymers may be made by Yamamoto or Suzuki ~~polymerisation~~ polymerization for which the appropriate monomers are accessed simply by halogenation of fluorene to form a 2,7-dihalofluorene. These ~~polymerisation~~ polymerization techniques enable ~~polymerisation~~ polymerization of fluorene monomers with a wide range of aromatic co-monomers and afford a high degree of control over regioregularity of the polymer. Thus, the physical and electronic properties of polyfluorenes may be tailored by appropriate selection of monomers.

Linkage of the fluorene repeat units through the 2- and 7- positions is important for ~~maximisation~~ maximization of conjugation through the repeat unit.

A focus in the field of PLEDs has been the development of full ~~colour~~ color displays for which red, green and blue electroluminescent polymers are required – see for example Synthetic Metals 111-112 (2000), 125-128. To this end, a large body of work has been reported in the development of electroluminescent polymers for each of these three ~~colours~~ color with red, green and blue emission as defined by PAL standard 1931 CIE co-ordinates.

The paragraph beginning on page 3, line 12 has been changed as follows:

For simplicity, a full ~~colour~~ color display will preferably have a common cathode material for all three electroluminescent materials. Thus, the problem of a large energy gap between the LUMO and the workfunction of the cathode for a typical blue electroluminescent material is likely to be exacerbated where a common cathode suitable for red and green materials is employed.

The paragraph beginning on page 3, line 22 has been changed as follows:

A further drawback of polyfluorenes is that blue electroluminescent polyfluorenes have a tendency to shift over time towards longer wavelengths, i.e. towards a redder ~~colour~~ color of emission. This effect is believed to be due to oxidative degradation and aggregation of the polymer.

The paragraph beginning on page 4, line 18 has been changed as follows:

It is therefore an object of the invention to provide a wide bandgap polymer having higher electron affinity than a polyfluorene, i.e. a material capable of blue emission and capable of serving as an electron transporting material for other blue and smaller bandgap emissive materials. It is a further object of the invention to provide such a polymer that does not suffer from undesirable steric effects; that does not suffer from a ~~colour~~ color shift over time; and that is readily soluble in common organic solvents. It is a yet further object of the invention to provide a host material for luminescent dopants, in particular phosphorescent dopants.

The heading on page 5, line 5 has been changed as follows:

~~Summary of the Invention~~

SUMMARY OF THE INVENTION

The paragraph beginning on page 5, line 27 has been changed as follows:

Preferably, at least one R¹ is a ~~solubilising~~ solubilizing group.

The paragraphs beginning on page 6, line 13 have been changed as follows:

In a third aspect, the invention provides a method of forming a polymer comprising the step of ~~polymerising~~ polymerizing the monomer of formula (II).

Preferably, each X is independently selected from the group consisting of boronic acid groups, boronic ester groups and borane groups and halide functional groups and the ~~polymerisation~~ polymerization is performed in the presence of a transition metal catalyst.

In one preferred embodiment of the third aspect, each X is the same or different and is a halide functional group, and the ~~polymerisation~~ polymerization is performed in the presence of a nickel complex catalyst.

In another preferred embodiment of the third aspect, the method comprises ~~polymerising~~ polymerizing:

The paragraph beginning on page 7, line 4 has been changed as follows:

wherein the reaction mixture comprises a catalytic amount of a palladium catalyst suitable for ~~catalysing~~ catalyzing the ~~polymerisation~~ polymerization of the aromatic monomers, and a base in an amount sufficient to convert the boron derivative functional groups into boronate anionic groups.

The paragraph beginning on page 9, line 23 has been changed as follows:

Preferably, at least one R² is a ~~solubilising~~ solubilizing group.

The paragraph beginning on page 20, line 11 has been changed as follows:

Suitable coordinating groups for the f-block metals include oxygen or nitrogen donor systems such as carboxylic acids, 1,3-diketonates, hydroxy carboxylic acids, Schiff bases including acyl phenols and iminoacyl groups. As is known, luminescent lanthanide metal complexes require ~~sensitising~~ sensitizing group(s) which have the triplet excited energy level higher than the first excited state of the metal ion. Emission is from an f-f transition of the metal and so the emission ~~colour~~ color is determined by the choice of the metal. The sharp emission is generally narrow, resulting in a pure ~~colour~~ color emission useful for display applications.

The paragraph beginning on page 21, line 15 has been changed as follows:

Main group metal complexes show ligand based, or charge transfer emission. For these complexes, the emission ~~colour~~ color is determined by the choice of ligand as well as the metal. A wide range of fluorescent low molecular weight metal complexes are known and have been demonstrated in organic light emitting devices [see, e. g., Macromol. Sym. 125 (1997) 1-48, US-A 5,150,006, US-A 6,083,634 and US-A 5,432,014], in particular tris-(8-hydroxyquinoline)aluminium. Suitable ligands for di or trivalent metals include: oxinoids, e. g. with oxygen-nitrogen or oxygen-oxygen donating atoms, generally a ring nitrogen atom with a substituent oxygen atom, or a substituent nitrogen atom or oxygen atom with a substituent oxygen atom such as 8-hydroxyquinolate and hydroxyquinoxalinol-10-hydroxybenzo (h) quinolinato (II), benzazoles (III), Schiff bases, azoindoles, chromone derivatives, 3-hydroxyflavone, and carboxylic acids such as salicylato amino carboxylates and ester carboxylates. Optional substituents include halogen, alkyl, alkoxy, haloalkyl, cyano, amino, amido, sulfonyl, carbonyl, aryl or heteroaryl on the (hetero) aromatic rings which may modify the emission ~~colour~~ color.

The paragraph beginning on page 24, line 14 has been changed as follows:

Electroluminescent devices may be monochrome devices or full ~~colour~~ color devices (i.e. formed from red, green and blue electroluminescent materials).

The heading on page 24, line 16 has been changed as follows:

~~Examples~~

EXAMPLES

The paragraph beginning on page 26, line 16 has been changed as follows:

To a solution of 4,4'-Dibromo-2,2'-dinitro-biphenyl (15.0 g, 37.3 mmol) in ethanol (abs., 186 cm³) was added 32 % w/w aqueous HCl (124 cm³). Tin powder (17.6 g, 147 mmol) was added portion-wise over 10 minutes and the reaction mixture was heated to reflux at 100 °C for 2 hours. After cooling, the mixture was poured into ice water (ca. 400 cm³) and then basified with 20% w/w aqueous NaOH solution (150 cm³). The product was extracted with diethyl ether and the organic layer washed with brine, dried over anhydrous MgSO₄ and evaporated to dryness. Purification by ~~reecrystallisation~~ recrystallization from ethanol afforded the title compound (9.2 g, 72 %) as light brown crystals (Found: C, 42.1; H, 3.0; N, 8.0. C₁₂H₁₀Br₂N₂ requires C, 42.2; H, 3.0; N 8.2 %); ν_{\max} / cm⁻¹ (Neat solid) 792, 994, 1406, 1477, 1608, 3210, 3357, 3443; δ_{H} (400 MHz, CDCl₃) 6.92 (6H, s, ArH), 3.78 (4H, brs, NH₂); δ_{C} (100 MHz, CDCl₃) 118.1, 121.7, 122.0, 122.7, 132.2, 145.4; m/z (ES) 340.9283 ([M+H]⁺. C₁₂H₁₁Br₂N₂ requires 340.9284), 343.1 (100 %), 263.1 (80), 185.1 (25).

The paragraph beginning on page 28, line 5 has been changed as follows:

t-Butyllithium (6.26 cm³, 10.6 mmol, 1.7 M in Pentane) was added over 2 h to a solution of 4,4'-dibromo-2,2'-diiodo-biphenyl (1.5 g, 2.66 mmol) in dry THF (30cm³) at -90 °C under nitrogen atmosphere. The mixture was stirred for a further 1 h at -90 °C.

Dichlorodihexylsilane was subsequently added and the mixture was stirred at room temperature overnight. The reaction was quenched with distilled water, and the THF was removed by vacuum. The product was then extracted into diethyl ether and the organic layer washed with brine, dried with anhydrous MgSO₄ and evaporated. Purification by column chromatography (hexane) yielded the title compound (0.7 g, 52 %) as a ~~colourless~~ colorless oil; ν_{\max} / cm⁻¹ (Neat liquid) 720, 813, 1001, 1072, 1384, 2855, 2923, 2956; δ_{H} (500 MHz, CDCl₃) 0.84-0.97 (10H, m, CH₂+CH₃), 1.22-1.36 (16H, m, CH₂), 7.55 (2H, dd, *J* 8.3 2.0, *ArH*), 7.64 (2H, d, *J* 8.3, *ArH*), 7.70 (2H, d, *J* 2.0, *ArH*); δ_{C} (100 MHz, CDCl₃) 12.0, 14.0, 22.5, 23.7, 31.3, 32.9, 122.2, 122.5, 133.0, 140.4, 146.0; δ_{Si} (100 MHz, CDCl₃) 4.1.

The paragraph beginning on page 31, line 12 has been changed as follows:

Polymer example 1: A homopolymer according to the first aspect of the invention was prepared by Suzuki ~~polymerisation~~ polymerization of Monomer 1 and Monomer 2 followed by end-capping with bromobenzene and phenylboronic acid according to the following scheme to afford dibenzosilole polymer PS6:

The paragraph beginning on page 33, line 1 has been changed as follows:

Polymer example 2: A copolymer according to the invention was prepared by Suzuki ~~polymerisation~~ polymerization as disclosed in WO 00/53656 with a diboronic acid of di(*n*-hexyl)fluorene followed by end-capping with bromobenzene and phenyl boronic acid to afford Polymer PS6F6 as shown below:

The paragraph beginning on page 35, line 10 has been changed as follows:

As can be seen from Figure 2(a), photoluminescence of the prior art PF6 polymer suffers from very significant ~~colour~~ color shift over time towards the red end of the visible spectrum. Incorporation of dibenzosilole repeat units into the PF6 polymer, as shown in Figure 2(b), results in a very significant reduction in this ~~colour~~ color shift, and ~~colour~~ color shift for the S6 homopolymer, as shown in Figure 2(c), is negligible.